IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application

Applicant(s):	Kwok et al.
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Examiner:	Sathyanaraya R. Pannala
Title:	Retrieving Handwritten Documents Using Multiple Document Recognizers and Techniques Allowing Both Typed and Handwritten Queries

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FOUR TIMES CORRECTED APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Appellants hereby submit this Four Times Corrected Appeal Brief to conform to the current format requirements. The original Appeal Brief was submitted on February 14, 2006 to appeal the final rejection dated September 14, 2005, of claims 1-37 of the above-identified patent application.

REAL PARTY IN INTEREST

The present application is assigned to International Business Machines Corporation, as evidenced by an assignment recorded on February 19, 2002 in the United States Patent and Trademark Office at Reel 012614, Frame 0448. The assignee, International Business Machines Corporation, is the real party in interest.

RELATED APPEALS AND INTERFERENCES

There are no related appeals and interferences.

STATUS OF CLAIMS

The Examiner has indicated that claims 1-8, 11-23, and 25-37 are pending in the above-identified patent application, and indicated that claims 9-10 and 24 would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims. Appellants therefore believe that claims 1-37 are pending. Claims 26-33, 35, and 36 remain rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. Claims 1-7, 12, 16, 19-22, 34, and 36 remain rejected under 35 U.S.C. §103(a) as being unpatentable over Tran (United States Patent Number 6,202,060), and further in view of Piersol (United States Patent Number 6,775,665), claims 8, 11, 13-15, 17-18, 23, and 25 remain rejected under 35 U.S.C. §103(a) as being unpatentable over Tran, in view of Piersol and in view of Keith (United States Patent Number 6,629,097), and claims 26-33, 35, and 37 remain rejected under 35 U.S.C. §103(a) as being unpatentable over Tran, and in view of Platt et al. (United States Patent Number 5,812,698). Claims 1, 6, 7, 13, 16, 21, 22, and 26-37 are being appealed.

STATUS OF AMENDMENTS

There have been no amendments filed subsequent to the final rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

The present invention is directed to techniques that allow both text (FIG. 2: 272, 273) and handwritten queries (FIG. 2: 270, 271), and the queries can be single-word or multiword. Generally, each handwritten word in a handwritten document (FIG. 2: 211) is converted to a document stack (FIG. 6: 680) of words, where each document stack (FIG. 6: 680) contains a list of text words and a word score of some type for each text word in the list. The query is also converted to one or more stacks of words. (FIG. 1: 120; page 7, lines 6-13.) A measure is determined from each query and document stack. (FIG. 1: 130; page 9, lines 4-16; page 10, lines 8-14; page 16, line 21, to page 17, line 13.) Documents that meet search criteria in the query are then selected based on the query and the values of the measures. (Page 18, lines 14-23; page 19, lines 14-19.) The

present invention also performs multiple recognitions, with multiple recognizers, on a handwritten document to create multiple recognized transcriptions of the document. The multiple transcriptions are used for document retrieval. (Page 29, lines 1-26.) In another embodiment, a single transcription is created from the multiple transcriptions, and the single transcription is used for document retrieval.

Independent claim 1 is directed to a computer-implemented method, comprising the steps of: creating a document stack from at least one word in a handwritten document (page 6, lines 5-16; page 7, line 6, to page 8, line 3); creating a query stack from a query (FIG. 1: 120; page 7, lines 6-13); and determining a measure between the document stack and the query stack (FIG. 1: 130; page 10, lines 8-14; page 16, line 21, to page 17, line 13).

Independent claim 13 is directed to a computer-implemented method, comprising the steps of: for each of a plurality of documents, performing the following steps: creating a document stack from at least one word in a text document (page 6, lines 5-16; page 7, line 6, to page 8, line 3); creating a query stack from a query (FIG. 1: 120; page 7, lines 6-13); determining a measure between the document stack and the query stack (FIG. 1: 130; page 10, lines 8-14; page 16, line 21, to page 17, line 13); and scoring the documents based on the measure, thereby creating a document score (FIG. 1: 140; page 10, line 21, to page 11, line 10; page 14, lines 15-22); and displaying each document whose document score meets a predetermined threshold (FIG. 1: 160; page 18, lines 14-23).

Independent claim 16 is directed to a computer-implemented method for retrieving a subset of handwritten documents from a set of handwritten documents, each of the handwritten documents having a plurality of document stacks associated therewith, the method comprising the steps of: a) creating at least one query stack from a query comprising one or more words, wherein each word is handwritten or typed (FIG. 1: 120; page 7, lines 6-13); b) selecting a handwritten document from the set of handwritten documents; c) selecting a document stack from the selected handwritten document; d)

determining a measure between the at least one query stack and the selected document stack (FIG. 1: 130; page 10, lines 8-14; page 16, line 21, to page 17, line 13); e) performing steps (c) and (d) for at least one document stack associated with the selected handwritten document (page 10, lines 8-14; page 16, line 21, to page 17, line 13); f) performing steps (b), (c), and (d) for each handwritten document of the set of handwritten documents (page 10, lines 8-14; page 16, line 21, to page 17, line 13); g) scoring each of the handwritten documents in the set of handwritten documents by using the query and the measures, thereby creating a number of document scores (FIG. 1: 140; page 10, line 21, to page 11, line 10; page 14, lines 15-22); and h) selecting the subset of handwritten documents for display by using the document scores (FIG. 1: 160; page 18, lines 14-23; page 19, lines 14-19).

Independent claim 26 is directed to a computer-implemented method, comprising the steps of: creating a first word recognition stack, by using a first handwriting recognizer, from at least one word (page 25, line 26, to page 26, line 18); creating a second word recognition stack, by using a second handwriting recognizer, from the at least one word (page 25, line 26, to page 26, line 18); and comparing the first and second word recognition stacks with a third word recognition stack to determine whether a handwritten document should be retrieved (page 25, line 26, to page 26, line 18).

Independent claim 34 is directed to a computer system, comprising: a memory (FIG. 7: 730) that stores computer-readable code; and a processor (FIG. 7: 720) operatively coupled to the memory (FIG. 7: 730), the processor (FIG. 7: 720) configured to implement the computer-readable code, the computer-readable code configured to: create a document stack from at least one word in a handwritten document (page 7, line 6, to page 8, line 3); create a query stack from a query (FIG. 1: 120; page 7, lines 6-13); and determine a measure between the document stack and the query stack (FIG. 1: 130; page 10, lines 8-14; page 16, line 21, to page 17, line 13).

Independent claim 35 is directed to a computer system, comprising: a memory (FIG. 7: 730) that stores computer-readable code; and a processor (FIG. 7: 720) operatively coupled to the memory (FIG. 7: 730), the processor (FIG. 7: 720) configured

to implement the computer-readable code, the computer-readable code configured to: create a first word recognition stack, by using a first handwriting recognizer, from at least one word (page 25, line 26, to page 26, line 18); create a second word recognition stack, by using a second handwriting recognizer, from the at least one word (page 25, line 26, to page 26, line 18); and compare the first and second word recognition stacks with a third word recognition stack to determine whether a handwritten document should be retrieved (page 25, line 26, to page 26, line 18).

Independent claim 36 is directed to an article of manufacture, comprising: a computer readable medium having computer-readable code means embodied thereon, the computer-readable program code means comprising: a step to create a document stack from at least one word in a handwritten document (page 7, line 6, to page 8, line 3); a step to create a query stack from a query (FIG. 1: 120; page 7, lines 6-13); and a step to determine a measure between the document stack and the query stack (FIG. 1: 130; page 10, lines 8-14; page 16, line 21, to page 17, line 13).

Independent claim 37 is directed to an article of manufacture, comprising: a computer readable medium having computer-readable code means embodied thereon, the computer-readable program code means comprising: a step to create a first word recognition stack, by using a first handwriting recognizer, from at least one word (page 25, line 26, to page 26, line 18); a step to create a second word recognition stack, by using a second handwriting recognizer, from the at least one word (page 25, line 26, to page 26, line 18); and a step to compare the first and second word recognition stacks with a third word recognition stack to determine whether a handwritten document should be retrieved (page 25, line 26, to page 26, line 18).

In another embodiment, the query is typewritten, and the step of creating a query stack comprises creating a query stack for each query word of the query (FIG. 1: 120; page 7, lines 6-13), wherein each query stack comprises a corresponding word from the query and an associated high word score for this word, and wherein each query stack comprises a plurality of other words having zero word scores associated therewith (page 12, lines 13- 20; page 22, line 25, to page 23, line 5).

In another embodiment, the query is typewritten, and the step of creating a query stack comprises creating a query stack for each query word of the query (FIG. 1: 120; page 7, lines 6-13), wherein each query stack comprises a corresponding word from the query and an associated high word score for this word, and wherein each query stack comprises at least one other word having a small word score associated therewith (page 8, lines 5-14).

In another embodiment, at least one of the words of the query is typewritten, and step (a) further comprises the step of creating a query stack for each of the at least one words of the query (FIG. 1: 120; page 7, lines 6-13), wherein each query stack comprises a corresponding word from the query and an associated high word score for this word, and wherein each query stack comprises a plurality of other words having zero word scores associated therewith (page 12, lines 13-20; page 22, line 25, to page 23, line 5).

In another embodiment, at least one of the words of the query is typewritten, and step (a) further comprises the step of creating a query stack for each of the at least one words of the query (FIG. 1: 120; page 7, lines 6-13), wherein each query stack comprises a corresponding word from the query and an associated high word score for this word, and wherein each query stack comprises at least one other word having a small word score associated therewith (page 12, lines 13-20; page 22, line 25, to page 23, line 5).

STATEMENT OF GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 26-33, 35, and 36 are rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. Claims 1-7, 12, 16, 19-22, 34, and 36 are rejected under 35 U.S.C. §103(a) as being unpatentable over Tran, and further in view of Piersol, claims 8, 11, 13-15, 17-18, 23, and 25 are rejected under 35 U.S.C. §103(a) as being unpatentable over Tran, in view of Piersol and in view of Keith, and claims 26-33, 35, and 37 are rejected under 35 U.S.C. §103(a) as being unpatentable over Tran, and in view of Platt et al.

ARGUMENT

Section 112 Rejections

Claims 26-33, 35, and 36 are rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. In particular, the Examiner asserts that the specification on page 29, lines 2-27, does not support the first word stack, second word stack, and third word stack as well as first handwriting recognizor and second handwriting recognizor. In the Response to Arguments section of the final Office Action, the Examiner asserts that the specification amendment is rejected because the specification amendment is done to incorporate the rejected claim in order to overcome the rejection (see, MPEP 601.01).

Appellants note that the specification has been amended to recite that

> a first word stack can be created from at least one word by using a first handwriting recognizor, and a second word stack can be created from at least one word by using a second handwriting recognizor. A determination of whether a document should be retrieved can then be made by comparing the first and second word stacks with a third word stack.

Support for this amendment can be found in originally filed claim 26. No new matter is introduced.

Regarding the rejection of the specification amendment because the specification amendment is done to incorporate the rejected claim in order to overcome the rejection, Appellants note that the claims are considered a part of the invention disclosure and therefore do not constitute new matter.

Independent Claims 1, 13, 16, 26 and 34-37

Independent claims 1, 16, 34, and 36 were rejected under 35 U.S.C. §103(a) as being unpatentable over Iran, and further in view of Piersol, independent claim 13 was rejected under 35 U.S.C. §103(a) as being unpatentable over Iran, in view of Piersol and in view of Keith, and independent claims 26, 35, and 37 were rejected under 35 U.S.C. §103(a) as being unpatentable over Iran, and in view of Platt et al.

Regarding claims 1, 34, and 36, the Examiner asserts that Tran teaches "creating a document stack from at least one word in a handwritten document" (FIG. 22, col. 31, line 66, to col. 32, line 16), and "creating a query stack from a query" (FIG. 1; col. 10, line 16). The Examiner acknowledges that Tran does not explicitly teach determining the measure between document and query stacks, but asserts that Piersol teaches this limitation (FIGS 8 and 9A; col. 13, lines 20-31 and 54-59). Regarding claims 26, 35, and 37, the Examiner asserts that Tran teaches creating a first word recognition stack by using a first handwriting recognizor from at least one word, creating a second word recognition stack by using a second handwriting recognizor from at least one word, and comparing the first and second word recognition stacks with a third word recognition stack to determine whether a handwritten document should be retrieved (FIG. 22; col. 31, line 66, to col. 32, line 16).

Appellants note that the present disclosure teaches that,

> in step 120, the query is converted to one or more query stacks. A query stack is a recognition stack having a number of words and, for each word, a word score. Basically, a recognition stack represents the text words, which a handwriting recognition engine determines from an ink word, that are the most likely set of possible text words corresponding to the ink word. In general, a recognition stack contains all possible words known to a handwritten recognition system. In practice, the recognition stacks are subjected to a word score threshold or a rank threshold, which essentially truncates the recognition stacks.
> (Page 7, lines 6-13.)

Appellants also note that the present disclosure teaches that

> the term "document stack" will be used for a recognition stack determined from a document. Again, a document stack is an N-best list as described above. It should be noted that, in general, there will be multiple recognition stacks per query or per document.
> (Page 7, line 27, to page 8, line 3.)

Thus, query stacks and document stacks are recognition stacks that represent the text words which a handwriting recognition engine determines from an ink word, that are the most likely set of possible text words corresponding to the ink word. In general, a recognition stack contains all possible words known to a handwritten recognition system. Thus, at least one of the recognized words is represented by more than one word in the stack. Tran does ***not*** disclose or suggest that a *stack contains more than one word*

corresponding to one of the recognized words, and does ***not*** disclose or suggest that *stacks represent the text words which a handwriting recognition engine determines from an ink word, that are the most likely set of possible text words corresponding to the ink word*. In addition, Piersol does not disclose or suggest determining a measure between document and query stacks, as defined in the present invention. Independent claims 1, 13, 34, and 36 require creating a document stack from at least one word in a handwritten or text document; creating a query stack from a query; and determining a measure between the document stack and the query stack. Independent claim 16 requires creating at least one query stack from a query comprising one or more words, wherein each word is handwritten or typed; selecting a handwritten document from the set of handwritten documents; selecting a document stack from the selected handwritten document; and determining a measure between the at least one query stack and the selected document stack. Independent claims 26, 35, and 37 require creating a first word recognition stack, by using a first handwriting recognizer, from at least one word; creating a second word recognition stack, by using a second handwriting recognizer, from the at least one word; and comparing the first and second word recognition stacks with a third word recognition stack to determine whether a handwritten document should be retrieved.

Thus, Tran and Piersol, alone or in combination, do not disclose or suggest creating a document stack from at least one word in a handwritten or text document; creating a query stack from a query; and determining a measure between the document stack and the query stack, as required by independent claims 1, 13, 34, and 36, do not disclose or suggest creating at least one query stack from a query comprising one or more words, wherein each word is handwritten or typed; selecting a handwritten document from the set of handwritten documents; selecting a document stack from the selected handwritten document; and determining a measure between the at least one query stack and the selected document stack, as required by independent claim 16, and do not disclose or suggest creating a first word recognition stack, by using a first handwriting recognizer, from at least one word; creating a second word recognition stack, by using a second handwriting recognizer, from the at least one word; and comparing the first and second word recognition stacks with a third word recognition stack to determine whether

a handwritten document should be retrieved, as required by independent claims 26, 35, and 37.

Additional Cited References

Keith was also cited by the Examiner for its disclosure that "each of the query and document stacks comprises a plurality of words, wherein the measure uses edit distances to compare words in the query stack to words in the document stack" (col. 20, lines 20-26). Appellants note that Keith is directed to a system for discerning and displaying relational structure and conceptual similarities among items in a target group of data items (see, Abstract). Keith does not disclose or suggest query stacks or document stacks, as defined in the present disclosure, and does not disclose or suggest that a stack contains more than one word corresponding to one of the recognized words. In addition, Keith does not disclose or suggest determining the measure between document and query stacks, as defined in the present invention.

Thus, Keith does not disclose or suggest creating a document stack from at least one word in a handwritten or text document; creating a query stack from a query; and determining a measure between the document stack and the query stack, as required by independent claims 1, 13, 34, and 36, does not disclose or suggest creating at least one query stack from a query comprising one or more words, wherein each word is handwritten or typed; selecting a handwritten document from the set of handwritten documents; selecting a document stack from the selected handwritten document; and determining a measure between the at least one query stack and the selected document stack, as required by independent claim 16, and does not disclose or suggest creating a first word recognition stack, by using a first handwriting recognizer, from at least one word; creating a second word recognition stack, by using a second handwriting recognizer, from the at least one word; and comparing the first and second word recognition stacks with a third word recognition stack to determine whether a handwritten document should be retrieved, as required by independent claims 26, 35, and 37.

Platt et al. was also cited by the Examiner for its disclosure of a "handwriting recognizing system using the input device as tablet on which characters are formed using a pen-like stylus" (FIG. 1; col. 3, line 66, to col. 4, line 3). Appellants note

that Platt is directed to a system for recognizing handwritten characters, including pre-processing apparatus for generating a set of features for each handwritten character, a neural network disposed for operating on sparse data structures of those features and generating a set of confidence values for each possible character symbol which might correspond to the handwritten character, and post-processing apparatus for adjusting those confidence values and for selecting a character symbol consistent with external knowledge about handwritten characters and the language they are written in. (See, abstract.) Platt does not disclose or suggest query stacks or document stacks, as defined in the present disclosure, and does not disclose or suggest that a stack contains more than one word corresponding to one of the recognized words. In addition, Platt does not disclose or suggest determining the measure between document and query stacks, as defined in the present invention.

Thus, Platt et al. do not disclose or suggest creating a document stack from at least one word in a handwritten or text document; creating a query stack from a query; and determining a measure between the document stack and the query stack, as required by independent claims 1, 13, 34, and 36, do not disclose or suggest creating at least one query stack from a query comprising one or more words, wherein each word is handwritten or typed; selecting a handwritten document from the set of handwritten documents; selecting a document stack from the selected handwritten document; and determining a measure between the at least one query stack and the selected document stack, as required by independent claim 16, and do not disclose or suggest creating a first word recognition stack, by using a first handwriting recognizer, from at least one word; creating a second word recognition stack, by using a second handwriting recognizer, from the at least one word; and comparing the first and second word recognition stacks with a third word recognition stack to determine whether a handwritten document should be retrieved, as required by independent claims 26, 35, and 37.

Claims 6 and 21

Regarding claims 6 and 21, the Examiner notes that Piersol teaches that, if a (saved) query is added to the stack, an HTML page representing *the query is appended to the stack*. Claims 6 and 21 require wherein the query is typewritten, and wherein the

step of creating a query stack comprises *creating a query stack for* ***each query word*** *of the query, wherein each query stack comprises a* ***corresponding word from the query and an associated high word score for this word****, and wherein each query stack comprises a plurality of other words having* ***zero word scores associated therewith***. Appellants could find no disclosure or suggestion by Piersol of these limitations.

Claims 7 and 22

Regarding claims 7 and 22, the Examiner notes that Piersol teaches that,

> referring to FIG. 9A, a listing of documents satisfying a query of "relative sentences" is shown. Within the list view, query results may be sorted by a variety of criteria such as, for example, creation source (the device that created or captured the document), creation time, file size, and search result score, all indicated by reference number 902. (Col. 13, lines 54-59.)

Claims 7 and 22 require wherein the query is typewritten, and wherein the step of creating a query stack comprises creating a query stack ***for each query word of the query****, wherein each query stack comprises a corresponding word from the query and an* ***associated high word score for this word****, and wherein each query stack comprises at least one other word having a* ***small word score associated therewith***. Appellants could find no disclosure or suggestion by Piersol of these limitations.

Conclusion

The rejections of the cited claims under section 103 in view of Tran, Piersol, Keith, and Platt et al., alone or in any combination, are therefore believed to be improper and should be withdrawn. The remaining rejected dependent claims are believed allowable for at least the reasons identified above with respect to the independent claims.

The attention of the Examiner and the Appeal Board to this matter is appreciated.

Respectfully,

Date: February 21, 2007

Kevin M. Mason
Attorney for Applicant(s)
Reg. No. 36,597
Ryan, Mason & Lewis, LLP
1300 Post Road, Suite 205
Fairfield, CT 06430
(203) 255-6560

CLAIMS APPENDIX

1. A computer-implemented method comprising the steps of:

creating a document stack from at least one word in a handwritten document;

creating a query stack from a query; and

determining a measure between the document stack and the query stack.

2. The method of claim 1, wherein:

the at least one word comprises a plurality of words;

the document stack corresponds to one of the plurality of words in the handwritten document;

the query comprises a plurality of query words and at least one operator;

the query stack corresponds to one of the plurality of query words; and

the step of determining a measure further comprises the step of, for each query stack, determining a measure between the query stack and each document stack in the handwritten document.

3. The method of claim 2, wherein each document stack comprises a plurality of document scores, and wherein the method further comprises the step of optimizing each of the document scores for the document stacks.

4. The method of claim 1, wherein the measure quantifies an amount of similarity between the document stack and the query stack.

5. The method of claim 1, wherein the query is handwritten, typewritten, or partially handwritten and partially typewritten.

6. The method of claim 5, wherein the query is typewritten, and wherein the step of creating a query stack comprises creating a query stack for each query word of the

query, wherein each query stack comprises a corresponding word from the query and an associated high word score for this word, and wherein each query stack comprises a plurality of other words having zero word scores associated therewith.

7. The method of claim 5, wherein the query is typewritten, and wherein the step of creating a query stack comprises creating a query stack for each query word of the query, wherein each query stack comprises a corresponding word from the query and an associated high word score for this word, and wherein each query stack comprises at least one other word having a small word score associated therewith.

8 The method of claim 1, wherein the measure is selected from the group consisting of a dot product measure, an Okapi measure, a score-based keyword measure, a rank-based keyword measure, a measure using n-grams, and a measure using edit distances.

9. The method of claim 1, where each query stack and document stack comprises a plurality of scores, wherein the measure is a dot product measure defined as follows

$$\cos\left(\vec{q},\vec{d}\right)=\frac{\vec{q}\cdot\vec{d}}{\sqrt{\left(\vec{q}\cdot\vec{q}\right)\left(\vec{d}\cdot\vec{d}\right)}},$$

where is a vector comprising scores from the query stack, and wherein $\vec{d}$ is a vector comprising scores from the document stack.

10. The method of claim 1, wherein each stack is not constrained to words in a vocabulary, wherein each of the words in a query stack or document stack are comprised of a number of n-grams, wherein probabilities are determined for each n-gram of the query stack and document stack, and wherein the probabilities of the n-grams are used in the measure.

11. The method of claim 1, wherein each of the query and document stacks comprises a plurality of words, wherein the measure uses edit distances to compare words in the query stack to words in the document stack.

12. The method of claim 1, further comprising the step of determining a document score for the handwritten document by using the measure.

13. A computer-implemented method comprising the steps of:

for each of a plurality of documents, performing the following steps:

creating a document stack from at least one word in a text document;

creating a query stack from a query;

determining a measure between the document stack and the query stack; and

scoring the documents based on the measure, thereby creating a document score; and

displaying each document whose document score meets a predetermined threshold.

14. The method of claim 13, wherein the query is a handwritten query.

15. The method of claim 13, wherein the query is a typewritten query.

16. A computer-implemented method for retrieving a subset of handwritten documents from a set of handwritten documents, each of the handwritten documents having a plurality of document stacks associated therewith, the method comprising the steps of:

a) creating at least one query stack from a query comprising one or more words, wherein each word is handwritten or typed;

b) selecting a handwritten document from the set of handwritten

documents;

c) selecting a document stack from the selected handwritten document;

d) determining a measure between the at least one query stack and the selected document stack;

e) performing steps (c) and (d) for at least one document stack associated with the selected handwritten document;

f) performing steps (b), (c), and (d) for each handwritten document of the set of handwritten documents;

g) scoring each of the handwritten documents in the set of handwritten documents by using the query and the measures, thereby creating a number of document scores; and

h) selecting the subset of handwritten documents for display by using the document scores.

17. The method of claim 16, wherein step (h) further comprises the step of selecting handwritten documents that are above a predetermined threshold.

18. The method of claim 17, wherein the predetermined threshold is selected from the group consisting of a rank threshold and a score threshold.

19. The method of claim 16, wherein each document stack comprises a plurality of word scores, and wherein the method further comprises the step of:

i) optimizing each of the word scores for the document stacks.

20. The method of claim 16, wherein the measure quantifies similarity between the document stack and the query stack.

21. The method of claim 16, wherein at least one of the words of the query is typewritten, and wherein step (a) further comprises the step of creating a query stack for

each of the at least one words of the query, wherein each query stack comprises a corresponding word from the query and an associated high word score for this word, and wherein each query stack comprises a plurality of other words having zero word scores associated therewith.

22. The method of claim 16, wherein at least one of the words of the query is typewritten, and wherein step (a) further comprises the step of creating a query stack for each of the at least one words of the query, wherein each query stack comprises a corresponding word from the query and an associated high word score for this word, and wherein each query stack comprises at least one other word having a small word score associated therewith.

23. The method of claim 16, wherein the measure is selected from the group consisting of a dot product measure, an Okapi measure, a score-based keyword measure, a rank-based keyword measure, a measure using n-grams, and a measure using edit distances.

24. The method of claim 16, wherein each stack is not constrained to words in a vocabulary, wherein each of the words in a query stack or document stack are comprised of a number of n-grams, wherein probabilities are determined for each n-gram of the query stack and document stack, and wherein the probabilities of the n-grams are used in the measure.

25. The method of claim 16, wherein each of the query and document stacks comprises a plurality of words, wherein the measure uses edit distances to compare words in the query stack to words in the document stack.

26. A computer-implemented method comprising the steps of:

creating a first word recognition stack, by using a first handwriting recognizer, from at least one word;

creating a second word recognition stack, by using a second handwriting recognizer, from the at least one word; and

comparing the first and second word recognition stacks with a third word recognition stack to determine whether a handwritten document should be retrieved.

27. The method of claim 26, wherein:

the at least one word is at least one handwritten word from the handwritten document;

the first word recognition stack comprises a first document stack;

the second word recognition stack comprises a second document stack; and

the third word recognition stack is a query stack determined from at least one query word.

28. The method of claim 26, wherein:

the at least one word is at least one word from a query;

the first word recognition stack comprises a first query stack;

the second word recognition stack comprises a second query stack; and

the third word recognition stack is a document stack determined from at least one handwritten word in the handwritten document.

29. The method of claim 26, further comprising the steps of:

configuring a handwriting recognizer into a first configuration to create the first handwriting recognizer; and

configuring the handwriting recognizer into a second configuration to create the second handwriting recognizer, wherein the first and second configuration are different.

30. The method of claim 29, wherein the first configuration comprises a configuration caused by selecting a constraint from the group consisting essentially of an

uppercase letter constraint, a lowercase letter constraint, a recognize digits constraint, a language constraint, a constraint wherein characters and words are recognized only if in a vocabulary, and a constraint wherein characters and words are hypothesized when not in a vocabulary, and wherein the second configuration comprises a configuration caused by selecting a constraint from the group consisting essentially of an uppercase letter constraint, a lowercase letter constraint, a recognize digits constraint, a language constraint, a constraint wherein characters and words are recognized only if in a vocabulary, and a constraint wherein characters and words are hypothesized when not in a vocabulary.

31. The method of claim 26, wherein the step of comparing further comprises the step of merging the first and second word recognition stacks to create a fourth word recognition stack that is compared with the third word recognition stack.

32. The method of claim 26, wherein the first handwriting recognizer has a first configuration, wherein the second handwriting recognizer has a second configuration, and wherein the first and second configurations are different.

33. The method of claim 32, wherein the first configuration comprises a configuration caused by selecting a constraint from the group consisting essentially of an uppercase letter constraint, a lowercase letter constraint, a recognize digits constraint, a language constraint, a constraint wherein characters and words are recognized only if in a vocabulary, and a constraint wherein characters and words are hypothesized when not in a vocabulary, and wherein the second configuration comprises a configuration caused by selecting a constraint from the group consisting essentially of an uppercase letter constraint, a lowercase letter constraint, a recognize digits constraint, a language constraint, a constraint wherein characters and words are recognized only if in a vocabulary, and a constraint wherein characters and words are hypothesized when not in a vocabulary.

34. A computer system comprising:

a memory that stores computer-readable code; and

a processor operatively coupled to the memory, the processor configured to implement the computer-readable code, the computer-readable code configured to:

create a document stack from at least one word in a handwritten document;

create a query stack from a query; and

determine a measure between the document stack and the query stack.

35. A computer system comprising:

a memory that stores computer-readable code; and

a processor operatively coupled to the memory, the processor configured to implement the computer-readable code, the computer-readable code configured to:

create a first word recognition stack, by using a first handwriting recognizer, from at least one word;

create a second word recognition stack, by using a second handwriting recognizer, from the at least one word; and

compare the first and second word recognition stacks with a third word recognition stack to determine whether a handwritten document should be retrieved.

36. An article of manufacture comprising:

a computer readable medium having computer-readable code means embodied thereon, the computer-readable program code means comprising:

a step to create a document stack from at least one word in a handwritten document;

a step to create a query stack from a query; and

a step to determine a measure between the document stack and the query stack.

37. An article of manufacture comprising:

a computer readable medium having computer-readable code means embodied thereon, the computer-readable program code means comprising:

a step to create a first word recognition stack, by using a first handwriting recognizer, from at least one word;

a step to create a second word recognition stack, by using a second handwriting recognizer, from the at least one word; and

a step to compare the first and second word recognition stacks with a third word recognition stack to determine whether a handwritten document should be retrieved.

EVIDENCE APPENDIX

There is no evidence submitted pursuant to § 1.130, 1.131, or 1.132 or entered by the Examiner and relied upon by appellant.

RELATED PROCEEDINGS APPENDIX

There are no known decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of 37 CFR 41.37.